Green Remediation:
Army Policy and Implementation

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Agenda

- What is Green Remediation?
- Overview of Headquarters Efforts
  - EPA Efforts
  - DoD Efforts
  - HQ Army Efforts
- Army Site Specific Examples
- HQ Army Next Steps

What is Green Remediation?

Green Remediation *- The practice of considering all environmental effects of a remediation strategy (i.e., the remedy selected and the implementation approach) early in the process, and incorporating options to maximize the overall environmental benefit of cleanup actions*

What is Green Remediation?

Green Approaches in Cleanup & Redevelopment

Deconstruction, Demolition, and Removal

Cleanup, Remediation, and Waste Management

Design and Construction for Reuse

Sustainable Use and Long Term Stewardship

- Reuse/recycle deconstruction and demolition materials
- Reuse materials on site whenever possible
- Consider future site use and reuse existing infrastructure
- Preserve/Reuse Historic Buildings
- Use clean diesel and low sulfur fuels in equipment and noise controls for power generation
- Retain native vegetation and soils, wherever possible
- Protect water resources from runoff and contamination

- Power machinery and equipment using clean fuels
- Use renewable energy sources, such as solar, wind, and methane to power remediation activities
- Improve energy efficiency of chosen remediation strategies
- Select remediation approaches, such as phytoremediation, that reduce resource use and impact on air, water, adjacent lands, and public health
- Employ remediation practices that can restore soil health and ecosystems and, in some cases, sequester carbon through soil amendments and vegetation

- Use Energy Star, LEED, and GreenScapes principles in both new and existing buildings
- Reduce environmental impact by reusing existing structures and recycling industrial materials
- Incorporate natural systems to manage stormwater, like green roofs, landscaped swales, and wetlands
- Incorporate Smart Growth principles that promote more balanced land uses, walkable neighborhoods, and open space
- Create ecological enhancements to promote biodiversity and provide wildlife habitat and recreation

- Reduce use of toxic materials in manufacturing, maintenance, and use of buildings and land
- Minimize waste generation, manage waste properly, and recycle materials used/generated
- Maintain engineering and institutional controls on site where waste is left in place
- Reduce water use by incorporating water efficient systems and use native vegetation to limit irrigation
- Maximize energy efficiency and increase use of renewable energy
- Take appropriate steps to prevent (re)contamination

EPA Green Remediation Efforts

- Documenting Best Management Practices
- Identifying emergent opportunities
- Establishing a community of practitioners
- Developing mechanisms and tools
- Partnering with state and local agencies / organizations
- Exploring options for a green remediation evaluation / verification system
- Baseline analyses, metrics
- MOUs (DOE-NERL, USACE)
- Superfund Green Remediation Work Group

www.clu-in.org/greenremediation

DoD Green Remediation Efforts

- DUSD(I&E)/EM is developing a policy memo to encourage Military Components to take action to learn more about green remediation and consider green remediation in current and future remedial activities
- DoD will not re-open RODs or other decisions and agreements that may already be in place or under negotiation, but rather consider options when and where they make sense to the Military Components

DoD Green Remediation Efforts

- Initial focus appears to be on learning about efforts underway by the Services to implement green remediation opportunities :
  - Preserving natural resources
  - Minimizing energy use and increasing energy efficiency
  - Minimizing carbon dioxide emissions
  - Improving water quality
  - Maximizing recycling and reuse of materials
  - Minimizing the overall footprint of the remedial system

HQ Army Green Remediation Efforts

- Including green remediation into FY2010-2011 Army Environmental Cleanup Strategic Plan
  - Incorporate best management practices that help to decrease the demand placed on the environment during remedial action operation and minimize the potential for collateral environmental damage
  - Emphasis mirrors the focus of OSD
- Supporting OSD's efforts to develop comprehensive DoD green remediation policy
- Review of the USACE Decision Framework for Incorporation of Sustainability into Army Environmental Remediation

Site Specific Examples

- Army has begun collecting site specific examples of green remediation practices currently employed at Army installations and FUDS.
- The examples presented are not representative of all Army efforts

Energy Example

Former Nebraska Ordnance Plant (FUDS)

Cleanup Objective: Remove TCE and destroy explosives in groundwater

Green Remediation Practices:

- Uses a 10-kW wind turbine to power ground water circulation wells for air stripping and UV treatment
- Calculated a total demand of 767 kWh each month for the circulation wells
- Determined electricity demand could be met by site conditions including wind speed of 6.5 meters/second

Turbine Photo Source: University of Missouri – Rolla

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Energy Example #2

Massachusetts Military Reservation (NGB)

Cleanup Objective: Green remediation initiatives, operation of groundwater cleanup systems

Green Remediation Practices:

- 94 sites, 23 plumes, Air Force and Army activities
- High efficiency pumps >$100,000 savings/yr
- In-situ remediation, natural processes vs pump and treat
- Biological treatment – Pilot test for bioreactor to removed perchlorate in groundwater
- Remedial process optimizations >$100,000 savings/yr

Air Force Turbine

Photo Source: USACE

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Water Example

Fort Sheridan, IL (BRAC)

Cleanup Objective: Wastewater Recycling

Green Remediation Practices:

- Leachate from several landfills accumulated and applied to land as irrigation
- Wastewater used to reduce the pressure on freshwater resources
- Leachate application system reduces CO2 emissions by eliminating the need for trucking operations

Landfill 7 Photo Source: BRACD

POC: Bill Brawner, bill.brawner@us.army.mil

Land and Ecosystems Example

Umatilla Army Depot (BRAC)

Cleanup Objective: Treat 15,000 tons of soil contaminated with explosives such as TNT and RDX

Green Remediation Practices:

- Composted with locally obtained feedstock
- Used windrow techniques involving placement of soil in lengthy piles
- Periodically mixed soil with a mixture of cattle/chicken manure, sawdust, alfalfa, and potato waste
- Mixed soil with feedstock inside mobile buildings to control fumes and optimize biological activity

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Land and Ecosystems Example #2

Volunteer Army Ammunition Plant (Excess)

Cleanup Objective: Treat soil contaminated with explosives DNT and TNT

Green Remediation Practices:

- Chemical oxidation of soil through Alkaline hydrolysis
- Soils were excavated and treated on-site within a contained asphalt-lined former pH control pond and treated in 300 yard increments
- Caustic soda was evenly spread on soil awaiting treatment
- On-site treatment resulted in no hazardous waste disposal, landfill space, or off-site backfill
- Average contaminant mass reduction is >93%
- Recycled water used for hydrolysis
- No risk from breakdown products

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Materials and Waste Example

Camp Withycombe (NGB)

Cleanup Objective: Remediation and Recycling of Small Arms Lead

Green Remediation Practices:

- Around 30,000 tons of soil was remediated at the soil washing plant.
- The soil treatment used a dry particle separation process and a wet soil washing process to remove bullets from the soil.
- All the water involved in the treatment process was reclaimed as well for reforestation irrigation.
- More than 270 tons of lead bullet fragments were reclaimed for recycling
- Received an Environmental Stewardship award from the National Guard

Soil Washing Plant Photo Source: NGB

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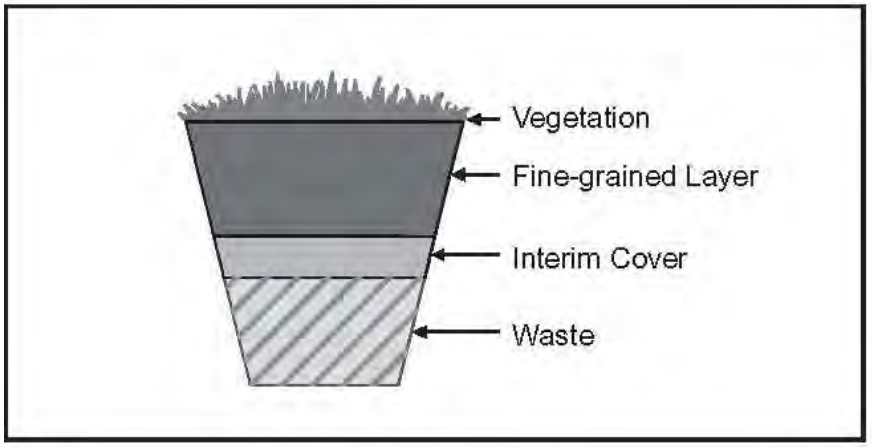
Stewardship Example

Fort Carson (Active)

Cleanup Objective: Contain 15-acre hazardous waste landfill

Green Remediation Practices:

- Installed a four-foot-thick monolithic ET cover
- Applied biosolids from an onsite wastewater treatment plant
- Revegetated with native prairie grass resistant to drought and disease
- Installed a layer of straw mulch to prevent erosion
- Provided uncompacted soil more conducive to plant growth



Conceptual Design of a Monolithic ET Cover Photo Source: EPA, OSWER

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HQ Army Next Steps

- Work to expand existing Army sustainability efforts to include environmental remediation
- Continue to collect current site-specific examples
- Developing Army Green Remediation guidance

Questions?

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